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**DESCRIPTION OF A NEW ARMADILLO (*DASYPUS NOVEMCINCTUS*) FROM MEXICO WITH REMARKS ON GEOGRAPHIC VARIATION OF THE SPECIES**

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In a collection of mammals obtained in Morelos, Mexico, in the summer of 1949 by a field party of the Wildlife Management Department, Agricultural and Mechanical College of Texas, was a single specimen of the nine-banded armadillo, *Dasypus novemcinctus*. This specimen, taken near Huitzilac, proved to be the first record of the armadillo in Morelos, as well as the first recorded specimen from the Rio Balsas drainage. At first examination this specimen was found to differ markedly in cranial characteristics from representative specimens of both *Dasypus n. fenestratus* Peters and *Dasypus n. mexicanus* Peters, the two subspecies reported to occur in Mexico, and suggested the possibility of an undescribed subspecies inhabiting the Balsas Basin. Consequently, an effort was made to secure additional specimens in later field explorations, and in the summer of 1950 three others were taken. One, an adult male, was taken at Tlacotepec, a locality in the Balsas Basin approximately 35 miles southeast of Huitzilac. The other two, both subadult males, were taken 5 km. north of Tres Cumbres (Tres Marias on some maps) at an elevation of 10,200 feet, in a pine-fir forest association. These other specimens from Morelos differed from recognized subspecies of *Dasypus novemcinctus* in North America in the same characteristics as the earlier specimen; and it seems appropriate, therefore, to recognize the Morelos armadillo as a new subspecies which may be known as

***Dasypus novemcinctus davisii* new subspecies**

74.6  
276 BP  
*Type.* Adult male, skin and skull, no. 4952 Texas Cooperative Wildlife Collection, Agricultural and Mechanical College of Texas; Huitzilac, 8500 feet, Morelos, Mexico; obtained by W. B. Davis, August 3, 1949, original no. 4909.

*Distribution.* Known from several localities in Morelos where it inhabits both the arid lowlands and the humid mountains of the north-western part of the state. Limits of range unknown, but probably occurs throughout the Balsas Basin.

*Diagnosis.* Size small (see measurements); tail short; hind foot small; skull small and short, but relatively broad, especially in rostrum; zygomata broad (relative to length of skull), but actually narrower than in other subspecies; suture between the squamosal and jugal well in front of highest point of posterior process on upper border of zygoma; interorbital breadth narrow; infraorbital canal short, approximately half as long as in *D. n. mexicanus*; nasals short; lacrimal almost square; lacrimal (anterior to the lacrimal foramen) averages 26.5 per cent as long as nasal; premaxillary reduced, permitting maxillary to extend almost to anterior limits of rostrum; parietal-frontal suture lies posterior to posterior process of zygoma; maxillary teeth small, angular process of lower jaw with posterior projection.

*Comparisons.* From *D. n. mexicanus*, the most closely related of described subspecies (specimens from Yucatan, Veracruz, Tamaulipas, Jalisco, and Texas), *D. n. davisii* differs as follows: Body smaller (total length averaging 698.5 as compared with 737); tail shorter (265.5 as compared with 344.5); hind foot smaller (average length 86.5 as compared with 100.5); skull smaller (occipital-nasal length 86.5 as compared with 97.6); zygomatic breadth less (averaging 40.1 as compared with 42.6); mastoid breadth slightly less; parietal-occipital suture only slightly concave, rather than deeply concave or emarginate; parietal-frontal suture lies well behind, instead of anterior to, posterior process of zygomatic arch; interorbital breadth less (21.8 as compared with 24.4); infraorbital canal approximately half as long as in *D. n. mexicanus*; nasals shorter (30.3 as compared with 35.4); lacrimal averaging 26.5 per cent of length of nasal (39.3 per cent in Texas specimens of *D. n. mexicanus* to somewhat less in examples from Veracruz); maxillary teeth small (less than half as large as in *D. n. mexicanus*); mandible slenderer; angular process well developed instead of usually wanting. From *D. n. fenestratus* (specimens from Costa Rica), *D. n. davisii* differs as follows: Body smaller; hind foot shorter and broader; interorbital constriction narrower (21.8 as compared with 22.5); zygomatic breadth slightly less (40.1 as compared with 42.0); suture between squamosal and jugal lies in front of posterior process of zygoma; zygoma narrower; infraorbital canal shorter; nasals shorter (30.3 as compared with 34.2); rostrum shorter and broader; maxillary teeth smaller.

*Measurements.* The type and an adult male from Tlacotepec, Morelos, measure as follows: Total length, 660, 737; length of tail, 276, 255; length of hind foot, 90, 83; occipital-nasal length, 89.0, 84.0; greatest zygomatic breadth, 39.5, 40.6; mastoid breadth, 26.3, 26.9; breadth of braincase (across squamosals), 29.8, 30.2; interorbital breadth, 21.5, 22.1; length of palatine along suture, 14.5, 14.0; length of lacrimal (anterior to lacrimal foramen), 9.8, 10.2; length of nasals, 32.0, 28.6; length of maxillary tooth-row, 20.8, 20.4.

*Remarks.* The type and the specimen (no. 4949, TCWC) from Tlacotepec are adults; each has the permanent maxillary teeth and the basioccipital ankylosed with the basisphenoid. The permanent teeth are rather late in making their appearance in *Dasyypus novemcinctus*, and when the milk dentition is replaced the animals are subadults. The suture between the basioccipital and basisphenoid disappears after replacement of the teeth, and absence of this suture is indicative of adult-

hood. After fusion of the two bones, the basioccipital area becomes swollen and highly rugose.

Seemingly intergradation between *D. n. davisi* and *D. n. mexicanus* takes place in the high mountains of northern Morelos. In the Sierra de Ajusco armadillos occur up to at least 10,200 feet elevation. Two specimens taken near Tres Cumbres, Morelos, have large maxillary teeth and long infraorbital canals, features that are characteristic of *D. n. mexicanus*. They are smaller than typical *D. n. mexicanus*, of equal age, and it seems advisable to refer them to *D. n. davisi*.

I take pleasure in naming this new subspecies in honor of Professor William B. Davis in recognition of his contributions to North American mammalogy.

Geographic variation of the nine-banded armadillo within Mexico is not well understood; however, certain preliminary conclusions can be made from material now available. Seemingly there are three well defined populations: one occurs along the east coast, another inhabits the northwest coast, and a third is found in the Balsas Basin of Mexico.

The eastern population, *D. n. mexicanus*, is known from scattered localities primarily in the coastal states east of the Sierra Madre Oriental. There are records from Yucatan, Veracruz, eastern Oaxaca, Tamaulipas, and Coahuila. The range of *D. n. mexicanus* extends northward into Texas and other Gulf Coast States (see Fitch, Goodrum, and Newman, 1952. The armadillo in the southeastern United States. Jour. Mamm., vol. 33:21-37), and southward into British Honduras, Honduras, and Guatemala. Peters, in the original description of *D. n. mexicanus*, failed to designate the type locality, and subsequently it has been established as Matamoros, Tamaulipas, Mexico (Hollister, 1925. The systematic name of the Texas armadillo. Jour. Mamm., vol. 6:60). I agree with Hollister in regarding *D. n. texanus* Bailey (type locality near Brownsville, Texas, directly across the Rio Grande from Matamoros) as a synonym of *D. n. mexicanus*. Specimens of *D. n. texanus* are not significantly different from examples of *D. n. mexicanus*; however, there is a gradual cline in the size of the skull from south to north. Specimens from Veracruz and Yucatan have smaller skulls than do Texas specimens, which are the largest North American armadillos.

Armadillos from northwest Mexico, now referred to *D. n. mexicanus*, are known to occur in the states of Sinaloa, Jalisco, Guanajuato, Michoacán, and the Distrito Federal. This population is separated geographically from other populations of *D. n. mexicanus* by wide areas from which no specimens are reported. There are no records from either the arid Central Plateau or from southwestern Mexico (Guerrero, western Oaxaca, and Chiapas).

Although the armadillo is often depicted as a desert-dwelling animal, it probably is restricted in distribution by notably xeric conditions. For example, it is abundant in the more humid southern Sinaloa, and seems to be absent in arid northern Sinaloa and Sonora where a desert environment prevails. Other evidence is offered by the northward dispersal of the armadillo into the relatively humid parts of eastern Texas (and the Southern United States), and not into the more arid parts of western Texas, except along streams where a more mesic environment is available (Strecker, 1926. The extension of range of the nine-banded

armadillo. Jour. Mamm., vol. 7:206-210). According to Taber (Contribution on the life history and ecology of the nine-banded armadillo. Jour. Mamm., vol. 26:211-226, 1945) high temperatures have little effect upon armadillos, but they do have an indirect effect by drying the soil, thus rendering probing difficult, and by limiting the principal food supply of soil-inhabiting insects. The scarcity of the latter may be the limiting factor in arid regions.

In view of the preceding evidence, it seems unlikely that the armadillo occurs in the Central Plateau of Mexico. This region is extremely arid and there are few permanent streams that are lined with mesic vegetation that would serve as avenues of dispersal. There seems to be little reason, on the other hand, why armadillos should not occur along the southwest coast of Mexico. None of the adverse conditions of a strictly desert environment is to be found in this region.

The third distinct population of the nine-banded armadillo in Mexico is *D. n. davisii*. It is now known from only a few localities in Morelos, but it probably occurs over most of the Balsas Basin. Intergradation between this subspecies and *D. n. mexicanus* occurs in the Sierra de Ajusco.

It seems unlikely that *D. n. fenestratus* is found as far north as Mexico. I have examined the specimen (no. 89335, UMMZ) from Teotitlan, Oaxaca, which was reported as *D. n. fenestratus* by Hooper (Notes on Mexican mammals. Jour. Mamm., vol. 28:40-57, 1947). Although it agrees with *D. n. fenestratus* in the position of the squamosal-jugal suture of the zygoma, other cranial features are matched by specimens of *D. n. mexicanus* from Veracruz and Yucatan. In referring this specimen to *D. n. mexicanus*, the range of *D. n. fenestratus* is hereby restricted to Central America only as far north as Nicaragua.

*Dasypus novemcinctus* probably had its primary differentiation and dispersal in either Central America or South America. As the armadillo extended its range northward into Mexico, it was confronted by the arid Central Plateau. Thus, *D. n. mexicanus* was split, the western population advancing northward until it reached the deserts of Sonora and the eastern population spreading northward into Texas. *Dasypus n. davisii* was derived from the west coast population of *D. n. mexicanus*, with which it has close affinities, in the isolated Balsas Basin that lies between the east and west coast populations of *D. n. mexicanus* and south of the Central Plateau.

The affinity of the west coast population of armadillos is clearly with *D. n. mexicanus* and not, as Hollister (*loc. cit.*) thought, with *D. n. fenestratus*. This is indicated by several cranial characteristics. The position of the suture between the squamosal and jugal is well in front of the posterior process of the zygoma, instead of behind it; the zygoma is narrower and less massive; the premaxillary is smaller; and the rostrum is relatively short and broad. Specimens from this west coast population differ also in several respects from examples of *D. n. mexicanus* from the east coast, especially from northeastern Mexico and Texas. The maxillary teeth are smaller and less robust; the parietal-frontal suture is posterior, rather than anterior, to the posterior process of the zygoma; the parietal-occipital suture is less deeply concave, and never emarginate as in specimens of *D. n. mexicanus* from Texas; the

mandible is narrower, and the angular process forms a posterior projection which is usually absent in typical *D. n. mexicanus*. It seems advisable at this time to regard the west coast population as *D. n. mexicanus*, although it is recognized that better material from there may warrant recognizing a third subspecies from Mexico.

*Dasyurus n. davis* is most closely allied to west coast specimens of *D. n. mexicanus*, although much smaller in size. This is illustrated by the small maxillary teeth, the position and development of the sutures, the narrow mandible, and the posterior projection of the angular process.

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All measurements herein are in millimeters. The following abbreviations have been used: AMNH for the American Museum of Natural History. TCWC for the Texas Cooperative Wildlife Collection, Agricultural and Mechanical College of Texas; KU for the University of Kansas, Museum of Natural History; and UMMZ for the University of Michigan, Museum of Zoology.

*Specimens examined.* A total of 49 as follows: *D. n. davis*. **Morelos:** Huitzilac (type locality), 1 (TCWC); 5 km. N Tres Cumbres, 2 (TCWC); Tlacotepec, 1 (TCWC). *D. n. fenestratus*. **Costa Rica:** 3 km. SE Turrialba, Prov. Cartago, 1 (KU); Palmax (Pacific), 1 (AMNH); Cataratos, San Carlos, 1 (AMNH). *D. n. mexicanus*. **Yucatan:** no specific locality, 2 (KU). **Veracruz:** 20 km ENE Jesus Carranza, 1 (KU); 20 km. E Jesus Carranza, 1 (KU); 35 km. SE Jesus Carranza, 1 (KU); 30 km. SSE Jesus Carranza, 1 (KU); 15 km. SW Jesus Carranza, 1 (KU). **Oaxaca:** Teotitlan, 1 (UMMZ). **Tamaulipas:** 4 km. WSW La Purísima, 1 (KU); 7 km. SW La Purísima, 1 (KU). **Texas:** Rock Island, 4 (KU); 6 mi. S Brady, McCulloch Co., 1 (KU); 35 mi. E Rocksprings, Real Co., 1 (TCWC); 3 mi. NNW Mason, Mason Co., 1 (KU); 4 mi. W Kyle, Hays Co., 1 (TCWC); 4 mi. N Groesbeck, Limestone Co., 1 (TCWC); 3 mi. S Kosse, Falls Co., 1 (KU); 10 mi. S Bryan, Brazos Co., 1 (TCWC); 10 mi. SE College Station, Brazos Co., 1 (TCWC); 17 mi. SW Huntsville, Walker Co., 1 (TCWC); 17 mi. WNW Huntsville. Walker Co., 1 (TCWC); 8 mi. NE Port Lavaca, Calhoun Co., 1 (KU). **Sinaloa:** Escuinapa, 5 (AMNH). **Nayarit:** South side Puerto de la Lima, 1 (KU). **Jalisco:** Medica, 1 (AMNH); ½ mi. S Purificación, 1 (KU); 5 km. S Purificación, 3 (KU); 8 mi. S Purificación, 1 (KU); Los Canos, 1 (AMNH). **Michoacan:** 18 mi. S and 1 mi. W Apatzingán, 1 (KU); 2 mi. S La Mira, 1 (KU). **Distrito Federal:** Zacayuca, 2 mi. N Tlalpan, 2 (KU).

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